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10/674,784	09/30/2003	Bernd Hofflinger	4965-000163	4456

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EXAMINER	
JERABEK, KELLY L	
ART UNIT	**PAPER NUMBER**
2622	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/674,784	Applicant(s) HOFFLINGER ET AL.	
	Examiner Kelly L. Jerabek	Art Unit 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-17 and 22-34 are rejected under 35 U.S.C. 102(b) as being anticipated by Shinotsuka et al. US 6,191,408.

Re claims 1, 6, 26-27 and 34, Shinotsuka discloses a method of correcting fixed pattern noise in image signals generated by image cells of an image sensor (1), each image signal comprising a plurality of instantaneous image values, the method comprising the steps of: defining at least two value ranges (linear function region and logarithmic function region) of possible instantaneous image values that the image signals might take at a specific instant of time (col. 5, lines 12-44; figures 1 and 3), providing a plurality of sets of correction coefficients (correction coefficient generating means 34 and 44) for calculating corrected values (by using corrective calculation sections 35 and 45) from the instantaneous values (the correction coefficients vary according to a given incident illumination Ls), wherein the sets of correction coefficients

are adapted to transform the instantaneous value onto a predefined approximation characteristic (linear characteristic and logarithmic characteristic), determining in which of the at least two value ranges a specific instantaneous value of the image signals is located, selecting a specific set of correction coefficients from the plurality of sets of correction coefficients as a function of the result of step c) (the correction coefficients vary according to a given incident illumination Ls), and calculating the corrected value for the image signal using the set of correction coefficients selected (via corrective calculation sections 35, 45) (col. 9, line 40-col. 11, line 27; figures 5-8). In addition Shinotsuka states that the approximation characteristic (characteristic curve) is a section of a parabola for at least one value range (logarithmic function region) (figures 3 and 9).

Re claim 2, Shinotsuka discloses an approximation characteristic (characteristic curve) is a section of a parabola for a first value range (logarithmic function region) and a straight line for a second value range (linear function region), the first value range covering two decades of brightness (figures 3 and 9; col. 5, lines 12-50).

Re claim 3, Shinotsuka states that the steps c) to e) are carried out separately for the image signals of each cell (calculations are carried out for each photosensor of the array) (col. 9, line 40-col. 11, line 27).

Re claim 4, Shinotsuka states that an individual set of correction coefficients (correction coefficient generating means 34 and 44) is used for each value range (linear function region and logarithmic function region) and for each image cell from the plurality of image cells (calculations are carried out for each photosensor of the array) (col. 10, lines 9-32, col. 10, line 55-col. 11, line 17).

Re claim 5, Shinotsuka states that the two value ranges (linear function region and logarithmic function region) are individual for each image cell (col. 5, lines 12-50).

Re claim 7, see claim 3.

Re claims 9-10, see claim 4.

Re claim 11, see claim 5.

Re claim 12, Shinotsuka states that a step of calculating a corrected value for an image signal by using a selected correction coefficient is executed for all image cells by means of transformation equations (provided by multiplier, subtraction circuit, divider, gradient calculation, etc.) that only differ due to different correction coefficients selected (col. 9, line 40-col. 11, line 27).

Re claims 13 and 14, Shinotsuka states that reference offset data are stored in a memory and the stored offset data is subsequently used to calculate correction coefficients which are then used in correction calculation sections (35,45) (col. 8, line 65-col. 9, line 4; col. 9, line 48-col. 11, line 27). Therefore, the transformation equations are specified by an arrangement of logic elements (adders, multipliers, subtraction circuit, divider, gradient calculation, etc.) which are supplied with the correction coefficients from a memory.

Re claim 15, Shinotsuka states that the correction coefficients (correction coefficient generating means 34 and 44) are determined from a comparison of an actual characteristic (actual logarithmic and linear characteristic), which specifies a relationship between an optical intensity (Ls) impinging on the respective image cell (photosensor 4) and the image signal generated, with a nominal characteristic (gradient calculation section 32,42 performs this operation) for each image cell (col. 8, line 55-col. 9, line 39; col. 9, line 40-col. 10, line 16; col. 10, line 41-col. 11, line 11).

Re claim 16, Shinotsuka states that the nominal characteristic is determined by computing a mean value (reference offset data Vfk) from the actual characteristics of the image cells (col. 9. lines 5-8).

Re claim 17, Shinotsuka states that the two value ranges (linear function region and logarithmic function region) are specified such that the actual characteristics and

the nominal characteristic each are approximately linear with respect to the logarithm of the optical intensity impinging on the image cells within the respective value ranges (figure 9, col. 11, line 29-col. 12, line 8).

Re claim 22, Shinotsuka states that the correction coefficients (generated by correction coefficient generating means 34 and 44) transform the value of the image signal onto a predefined approximation characteristic (logarithmic and linear characteristics) (figure 9; col. 10, line 9-32, col. 11, line 4-col. 12, line5).

Re claims 23 and 24, Shinotsuka shows that the predefined approximation characteristic is a straight line for at least one value range (linear function region) and the approximation characteristic is a section of a parabola for at least one value range (logarithmic function region) (figure 9).

Re claim 25, Shinotsuka discloses an approximation characteristic (characteristic curve) is a section of a parabola for a first value range (logarithmic function region) and a straight line for a second value range linear function region), the first value range covering two decades of brightness (figures 3 and 9; col. 5, lines 12-50).

Re claims 28-30, Shinotsuka states that reference offset data are stored in a memory and the stored offset data is subsequently used to calculate correction coefficients which are then used in correction calculation sections (35,45) (col. 8, line

65-col. 9, line 4; col. 9, line 48-col. 11, line 27). Therefore, the transformation equations are specified by an arrangement of logic elements (adders, multipliers, subtraction circuit, divider, gradient calculation, etc.) which are supplied with the correction coefficients from a memory.

Re claim 31, Shinotsuka states that the memory is adapted to be supplied with information (reference offset data) relating to the image cell which is to be read out (col. 8, line 65-col. 9, line 4).

Re claims 32-33, Shinotsuka states that each individual photosensor (4) of the image sensor (1) has a characteristic which is represented by an output voltage versus incident illumination characteristic curve K. Additionally variations in sensor output between the photosensors (4) contains the offset variation occurring at inflection points (Y) on the characteristic curve (col. 5, lines 18-50). Shinotsuka further states that the variations in the inflection point data Va between the photosensor (4) of the image sensor (1) are corrected or canceled by the correcting device (6) using calculated correction coefficients (col. 11, lines 29-64; figures 3 and 9). Therefore, it can be seen the correcting device (6) disclosed by Shinotsuka serves as a discriminator adapted to store threshold values (inflection points Y) which are individual for at least a number of image cells and also a threshold value calculating unit adapted to calculate threshold values (inflection point data Ya) from the correction coefficients supplied).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinotsuka et al.

Re claim 35, the characteristic processing embodiment according to Shinotsuka discloses all of the limitations of claim 34 above. In addition, the embodiment discloses providing a plurality of sets of correction coefficients (correction coefficient generating means 34 and 44) for calculating corrected values (by using corrective calculation sections 35 and 45) from the instantaneous values (the correction coefficients vary according to a given incident illumination Ls), wherein the sets of correction coefficients are adapted to transform the instantaneous value onto a predefined approximation characteristic (linear characteristic and logarithmic characteristic), determining in which of the at least two value ranges a specific instantaneous value of the image signals is located, selecting a specific set of correction coefficients from the plurality of sets of correction coefficients as a function of the result of step c) (the correction coefficients

vary according to a given incident illumination Ls), and calculating the corrected value for the image signal using the set of correction coefficients selected (via corrective calculation sections 35, 45) (col. 9, line 40-col. 11, line 27; figures 5-8). In addition Shinotsuka states that the approximation characteristic (characteristic curve) is a section of a parabola for at least one value range (logarithmic function region) (figures 3 and 9). However, although the embodiment discloses correction coefficients for calculating corrected values from instantaneous values it fails to state that the correction coefficients are stored in a memory.

Shinotsuka discloses in a modified correcting device (60) a temperature correction coefficient storage section (62) that includes a memory such as a ROM for storing correction coefficients that are used to compensate for the change in the output of an image sensor due to a variation of ambient temperature (col. 12, line 46-col. 13, line 19). Therefore, it would have been obvious for one skilled in the art to have been motivated to include a memory for storing correction coefficients as disclosed by the modified correcting device for temperature correction disclosed by Shinotsuka in the characteristic processing correcting device in order to store the characteristic correction coefficients disclosed by Shinotsuka. Doing so would provide a means for accessing calculated characteristic correction coefficients at any time in order to correct an image signal using the linear and logarithmic characteristic correcting means disclosed by Shinotsuka.

Re claim 36, Shinotsuka discloses an approximation characteristic (characteristic curve) is a section of a parabola for a first value range (logarithmic function region) and a straight line for a second value range (linear function region), the first value range covering two decades of brightness (figures 3 and 9; col. 5, lines 12-50).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 18-21 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 18, the claim states that the corrected value for the image signal is determined from an actual value generated by the image cell based on a transformation equation of the following form $V_c = a * V_r + b$. However, the claim does not define the value V_r and additionally the equation is missing parenthesis to indicate which portions of the equation should be included in the multiplication (eg. is the equation meant to be $V_c = a * (V_r + b)$ or $V_c = (a * V_r) + b$).

Re claim 19, the claim states that the correction coefficients a and b are: $a = a_i / a_r$ and $b = b_i - a_i / a_r * b_r$. However, the claim does not define the values a_i, a_r, b_i, b_r, and additionally the equation is missing parenthesis to indicate which portions of the equation should be included in the multiplication (eg. is the equation meant to be $b = (b_i - a_i / a_r) * b_r$ or $b = b_i - (a_i / a_r * b_r)$. In addition, the V_i and V_r equations are also missing necessary parenthesis.

Re claims 20-21, see claims 18 and 19.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Response to Remarks:

Tanaka (US 6,762,398) discloses an imaging device with fixed-pattern-noise correction regulated constant-current source. The information regarding fixed pattern noise correction in an image sensor is relevant material.

Kuroda et al. (US 6,798,452) discloses a solid-state imaging device. The information regarding fixed pattern noise correction in an image sensor is relevant material.

Koren et al. (US 6,831,686) discloses a method and device for the exposure-dependent noise correction in image sensors that can be addressed in lines and columns. The information regarding fixed pattern noise correction in an image sensor is relevant material.

Sauer et al. (US 5,969,616) discloses DC offset and gain-correction for CMOS image sensors. The information regarding fixed pattern noise correction in an image sensor is relevant material.

Sauer (US 6,320,616) discloses a CMOS image sensor with reduced fixed pattern noise. The information regarding fixed pattern noise correction in an image sensor is relevant material.

Contacts

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kelly L. Jerabek whose telephone number is **(571) 272-7312**. The examiner can normally be reached on Monday - Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivek Srivastava can be reached on **(571) 272-7304**. The fax phone number for submitting all Official communications is **(703) 872-9306**. The fax phone number for submitting informal communications such as drafts, proposed amendments, etc., may be faxed directly to the Examiner at **(571) 273-7312**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KLJ

Kelly LJ

TUAN HO
PRIMARY EXAMINER